



Mechanism that links perceived racism and discrimination and youth cannabis use, a structural equation modeling approach

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ABSTRACT

Background and Objectives: Exposure to discrimination stands as a prevalent social stressor and social determinant of health. This study sought to examine mechanisms linking perceived racism and discrimination (PRD) with youth cannabis use.

Methods: Data were drawn from the 2021 Adolescent Behaviors and Experiences Survey (n = 7,705). Latent variables were constructed to assess stress and mental health, sleep disorder and lack of physical activity, lack of family and peer support, and financial adversity. Separate mediation analyses were conducted to examine the pathways from PRD to current (past 30-day), and frequent (≥ 20 days in the past 30-day) cannabis use, adjusted by sociodemographic factors.

Results: Adolescents with PRD (vs. no PRD) reported a higher prevalence of current use (16.2 % vs. 10.9 %, $p < 0.0001$) and frequent use (4.6 % vs. 2.7 %, $p = 0.008$). Stress and mental health mediated the pathways from PRD to current ($\beta_{\text{indirect effect}} [SE] = 0.02 [0.01]$, $p = 0.02$) and frequent cannabis use ($\beta_{\text{indirect effect}} [SE] = 0.03 [0.01]$, $p < 0.001$). Financial adversity was associated with current ($\beta [SE] = 0.15 [0.06]$, $p = 0.01$) and frequent cannabis use ($\beta [SE] = 0.26 [0.08]$, $p = 0.002$). Sleep disorder and physical activity did not significantly mediate the relationship between PRD and current or frequent cannabis use. Lack of family and peer support showed no association with cannabis use.

Conclusions: This national study identified important latent factors that are associated with youth cannabis use. Targeted interventions that reduce stress might mitigate the impacts of PRD on adolescent's cannabis use.

1. Introduction

Perceived racism and discrimination (PRD) represent the subjective experiences and feelings of individuals who believe they have been treated differently than others based on their race, ethnicity, or cultural identity (Kressin, Raymond, & Manze, 2008). Exposure to PRD was prevalent among U.S. adolescents, and a recent national study reported that nearly one-third of U.S. high school students reported perceived racism in school in 2021, with the prevalence being particularly higher among racial minorities, such as Asian (63.9 %), Black (55.2 %), and multiracial high school students (54.5 %) than their White peers (22.5 %) (Mpofu et al., 2022). Previous studies have documented profound effects of exposure to PRD on youth well-being (Anderson, 2013; Cave, Cooper, Zubrick, & Shepherd, 2020; Paradies et al., 2015; Williams,

Lawrence, & Davis, 2019; Yang, Chen, Choi, & Kurtulus, 2019) and identified it as a key social determinant of substance use (Amaro, Sanchez, Bautista, & Cox, 2021; H. D. Dai, Thiel, & Hafer, 2024; Gibbons, Gerrard, Cleveland, Wills, & Brody, 2004; Otiniano Verissimo, Gee, Ford, & Iguchi, 2014). For instance, in the cross-sectional data from 2021, Dai et al. found that perceived racism and discrimination at school were positively associated with current use of tobacco, cannabis, and alcohol, as well as misuse of prescription opioids among U.S. high school students (H. D. Dai et al., 2024).

Longitudinal studies provide evidence for the direction of the association between PRD and cannabis use. In a study of 806 black and 655 white youth at 13, 15, 17 and 19 years of age, racial discrimination predicted cannabis initiation and time to first cannabis use disorder symptoms after initiation (Ahuja, Haeny, Sartor, & Bucholz, 2022). In a

Abbreviations: ABES, Adolescent Behaviors and Experiences Survey; OR, odds ratio; CI, confidence interval; NH, Non-Hispanic; SEM, Structural Equation Modeling.

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study that asked 610 8th graders about their experiences with school-based racial discrimination and measured their cannabis use in 11th grade, racial discrimination predicted increased cannabis use (Jelsma & Varner, 2020). The relationship was moderated by peer pressure to use drugs in 8th grade such that in the presence of low peer pressure, the risk of cannabis use was higher. In a larger sample size from the Adolescent Brain Cognitive Development (ABCD) study of 6,003 non-Latino White and 1,562 non-Latino black youth ages 9 and 10 were asked about their experiences with racial discrimination. Both groups showed that baseline discrimination was associated with increased risk of subsequent cannabis initiation three years later (Assari, Najand, & Sheikhattari, 2024).

Cannabis has remained one of the most commonly used drugs among U.S. adolescents over the past four decades (Johnston et al., 2023). In 2022, about 5.0 %, 12.1 %, and 20.2 % of U.S. 8th-, 10th-, and 12th-grade students reported past 30-day use of cannabis, respectively (Johnston et al., 2023). Despite the evolving societal context with increasing public support for cannabis legalization, (Pew Research Center, 2022) there is a recognized need to prioritize understanding the pathway and factors contributing to the relationship between discrimination and high-risk behaviors, including cannabis use among adolescents (Williams et al., 2019).

The mechanism underlying PRD and youth cannabis use can be multifaceted and complicated. Exposure to PRD can lead to feelings of anger, sadness, frustration, and loss of self-esteem (Cave et al., 2020; Paradies et al., 2015; Williams et al., 2019; Yang et al., 2019). Together, these emotions can predispose youth to significant psychological distress such as anxiety and depression as well as sleep disorders. Youth with PRD may seek solace in sedentary activities (e.g., watching TV) rather than engaging in physical activities (Slopen, Lewis, & Williams, 2016; Womack et al., 2014). Cannabis is often used as a coping mechanism in response to stressors and has been associated with mental health disorders, negative health outcomes, and a propensity to explore other substances (Gerrard et al., 2012; Green, Doherty, & Ensminger, 2017; Lanaway & Burlew, 2021; Scheier & Griffin, 2021).

Additionally, family and peer support has long been documented as a protective factor for youth substance use (Loke & Mak, 2013; Wills, Resko, Ainette, & Mendoza, 2004). Adolescents who encounter PRD may proactively seek social support from various sources, such as peers, parents, and family members. Conversely, a deficiency in familial and peer support networks can exacerbate tendencies toward substance use among these individuals. Moreover, financial adversity, characterized by economic instability, limited access to resources, and precarious financial situations, serves as a significant determinant influencing patterns of substance use among individuals. For instance, Nagata (Nagata et al., 2021) and Whittle (Whittle et al., 2019) established a link between food insecurity and substance use in two different populations, while other studies (Judd, Hughes, Bellis, Hardcastle, & Amos, 2023; Rege, Telle, & Votruba, 2011) showed that parent job loss could have a negative impact on adolescent mental health and academic performance. The presence of financial adversity could intensify psychological distress and heighten the consumption of cannabis products. Collectively, understanding how these factors independently and jointly influence the relationship between exposure to PRD and youth cannabis use can inform the development of targeted interventions to alleviate negative consequences stemming from perceived discrimination.

Adolescent cannabis use can be measured in different ways, such as current use (e.g., past 30 days) and frequent use (i.e., ≥ 20 occasions in the past 30 days) (H. Dai, 2019; Terry-McElrath, O'Malley, & Johnston, 2020). Understanding mechanisms underlying different cannabis use behaviors (e.g., current vs. frequent use) can shed light on tailored strategies to prevent and reduce youth cannabis use. Additionally, prior studies that have examined adolescent cannabis use behaviors using regression models are subject to multicollinearity and measurement errors (H. Dai, 2019; van den Bree & Pickworth, 2005; Zuckermann, Gohari, de Groh, Jiang, & Leatherdale, 2019).

To address knowledge gaps, this study analyzed a nationally representative sample of U.S. high school students to explore the pathways underlying PRD and adolescent cannabis use through the utilization of latent variables in several important domains and the structural equation model (SEM). The change from regression to SEM is motivated by the recognition that SEM can help describe the influence of various correlated risk factors through latent variables on cannabis use and offers crucial insights into the distinctive contribution of each factor amid the presence of other factors (Mueller, 1996). We hypothesize that the pathway from PRD to cannabis use is mediated by stress and mental health as well as sleep disorder and lack of physical activities and is further influenced by lack of family and peer support, and financial adversity.

2. Methods

2.1. Data

Data for this study were drawn from the Adolescent Behaviors and Experiences Survey (ABES), conducted by the Centers for Disease Control and Prevention (CDC) from January to June 2021. The survey was conducted online by employing a stratified, three-stage cluster sampling method to provide a nationally representative sample of U.S. students in grades 9–12. Participation was voluntary, requiring parental permission and students' consent. In 2021, the ABES achieved a school response rate of 38 % and a student response rate of 48 %, resulting in an overall response rate of 18 %. Detailed information on ABES survey design and data collection methods has been previously documented (Rico et al., 2022). As the study utilizes publicly available data with de-identified information, it is exempted by the University of Nebraska Medical Center Institutional Review Board.

2.2. Measures

2.2.1. Cannabis use (outcome variable)

Participants were asked, "During your life, how many times have you used marijuana?" those who reported ≥ 1 time were categorized as ever marijuana users (vs. never users for those who reported 0 times). They were further asked, "During the past 30 days, how many times did you use marijuana?" with response options "0 times," "1 or 2 times," "3 to 9 times," "10 to 19 times," "20 to 39 times," "40 or more times." Those who responded ≥ 1 time using cannabis during the 30 days before the survey were classified as current cannabis users (vs. no current use with 0 times). We also created a variable to measure frequent cannabis use (≥ 20 times using cannabis during the 30 days vs. < 20 times) based on previous literature examining the risks of cannabis use (Terry-McElrath et al., 2020; van der Pol et al., 2013).

2.2.2. Perceived racism and discrimination (PRD, exposure variable)

The PRD was measured by a single item from the Perceptions of Racism in Children and Youth (PRaCY) scale (Pachter, Szalacha, Bernstein, & Coll, 2010), and participants were asked, "During your life, how often have you felt that you were treated badly or unfairly in school because of your race or ethnicity?" Adolescents who responded "Never" were classified as having no exposure to PRD, and those who answered "Rarely," "Sometimes," "Most of the time," and "Always" were classified as having exposure to PRD (Mpofu et al., 2022).

2.2.3. Latent variables (mediators)

Stress and Mental Health included: 1) *feeling sad* (yes vs. no) in the past 12 months; 2) *being bullied* on school property or electronically (yes vs. no) in the past 12 months; 3) *suicide ideation* (yes vs. no) in the past 12 months; and 4) *mental health problem* in the past 30 days (most of the day/always vs. never/rarely/sometimes) (Lowry, Dunville, Robin, & Kann, 2017; Stone et al., 2014). See survey questions in the footnote of Table 2.

Sleep disorder and lack of physical activities included: 1) *very short sleep duration* on an average school night (≤ 5 h vs. > 5 h); 2) *lack of physical activities* in the past 7 days (≤ 4 days vs. > 4 days); 3) excess screen time on an average school day (≥ 3 h vs. < 3 h) (Johnson, Cohen, Kasen, First, & Brook, 2004).

2.2.4. Latent variables (other influencing factors)

Lack of family and peer support included: 1) *lack of social connection* (never/rarely vs. sometimes/most of the time/always); 2) *Not close to people at school* (not sure /disagree/strongly disagree vs. agree/strongly agree); Two additional variables were created to measure how often participants were swore at, insulted, or put down (*parent insult*) and how often they were hit, beat, kick, or physically hurt you in any way (*parent abuse*) by a parent or other adult in your home (rarely/sometimes/most of the time/always vs. never) (Mpofu et al., 2022).

Financial adversity included 1) *parent job loss* if the family lost a job during the COVID-19; 2) *self job loss* if students lost a job during the COVID-19; and 3) *short of food* (sometimes/most of the time/always vs. rarely/never) (Mpofu et al., 2022).

2.2.5. Covariates

Sociodemographic covariates included age (< 15 or ≥ 15 years old), gender (male or female), race/ethnicity (non-Hispanic [NH] white, NH black, Hispanic, NH Asian, and NH others [American Indian or Alaska Native, Native Hawaiian/Other Pacific Islander, and multiple races]), sexual minority status (heterosexual, gay/lesbian, bisexual, and unsure or unknown), and instructional mode (in-person only, virtual only, and hybrid).

2.2.6. Statistical methods

Weighted statistics (%) and 95 % confidence interval [CI] were reported for exposure to PRD and sociodemographic distributions, overall and by cannabis use status (current and frequent use). Rao-Scott Chi-square tests assessed significant group differences by cannabis use

status. Descriptive analyses were performed using SAS 9.4 (Cary, NC), and a p-value < 0.05 was considered statistically significant.

Influencing factors were included in the confirmatory factor analysis to construct four latent variables (i.e., stress and mental health, sleep disorder and lack of physical activities, lack of family and peer support, and financial adversity). The root mean square error of approximation (RMSEA) was calculated to assess the model fit. Separate SEMs were conducted to test pathways from PRD to current and frequent cannabis use through two latent variables as parallel mediators (i.e., stress and mental health, sleep disorder and lack of physical activities) using the maximum likelihood ratio estimator (Bollen, 1989). The analysis yielded estimates on total effects, indirect effects, direct effects, and the proportion of mediation. Sociodemographic covariates (e.g., age, sex, race/ethnicity, and sexual minority status), mode of instruction, and two latent variables (i.e., lack of family and peer support, and financial adversity) were adjusted for in the mediation analysis. A conceptual model of the pathways underlying PRD and adolescent cannabis use is provided in Fig. 1.

Linear model weights (bs) and mediation standardized estimates (β s) were calculated using Mplus 8.3 (MUTHEN & MUTHEN). P-values < 0.05 (two-tailed) were considered significant. Survey stratum and sampling weights were incorporated in all analyses to account for the complex survey design and adjust for non-respondents, resulting in nationally representative estimates of all students in grades 9–12 attending public and private schools in the United States.

3. Results

3.1. Summary of sample characteristics

A diverse sample of respondents ($n = 7,705$) comprised 36.2 % aged 15 years or younger, 49.6 % females, 12.9 % Blacks, 25.4 % Hispanics, 4.9 % Asians, 3.0 % gay/lesbian students, 10.0 % bisexuals, and 11.0 % unsure or unknown about their sexual identity. A majority of

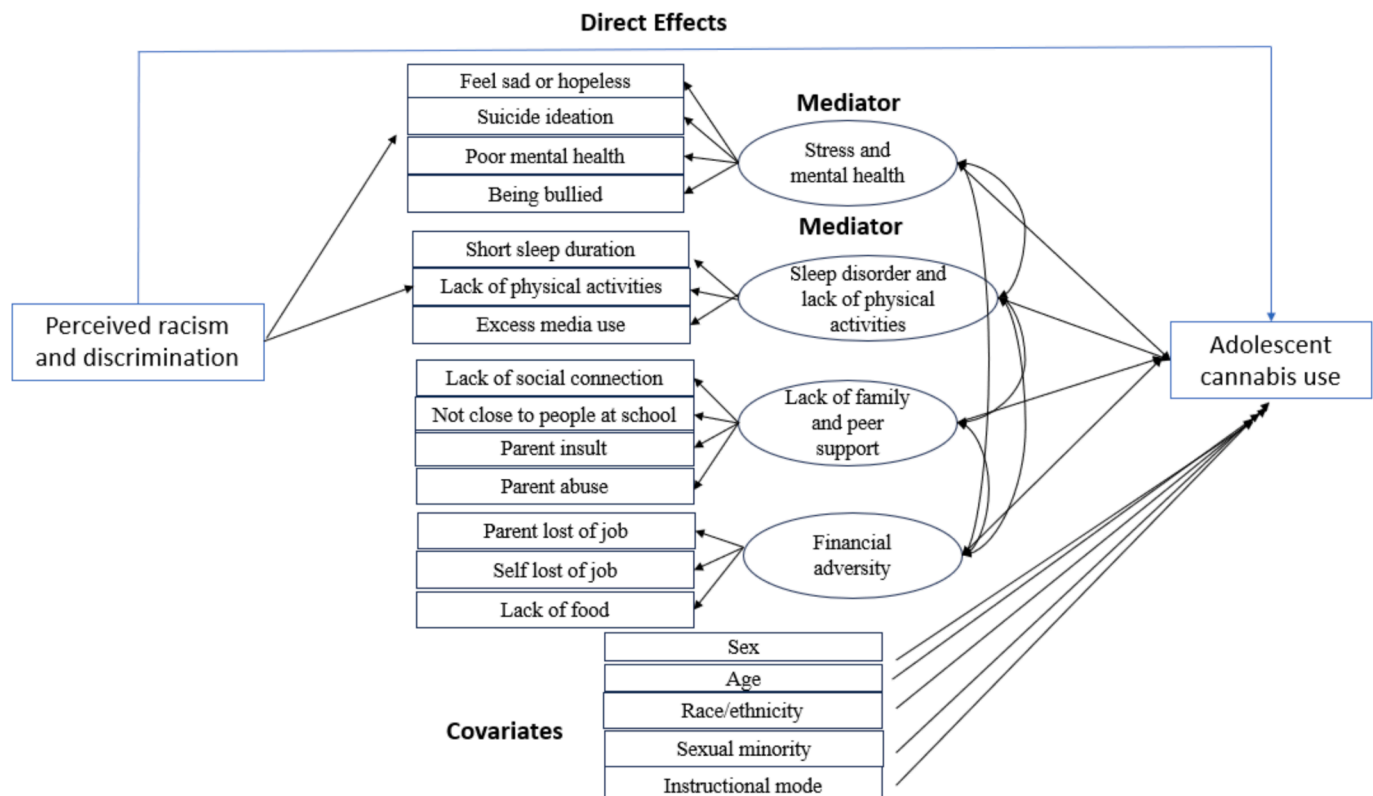


Fig. 1. Conceptual model of pathways underlying PRD and adolescent cannabis use.

participants (73.2 %) reported hybrid instructional mode, 24.4 % virtual only, and 2.4 % in-person only. Among all participants, 31.3 % reported experiencing perceived discrimination and racism, 12.8 % reported current cannabis use, and 3.4 % reported frequent cannabis use. The prevalence of PRD differed across race/ethnicity and sexual orientation status. For instance, the prevalence of PRD was highest among NH Asian adolescents (63.9 %), followed by NH Black (55.2 %), NH other race (51.4 %), Hispanic (41.4 %), and NH White (22.5 %) adolescents (see Table 1 footnote). The sociodemographic distribution significantly differed by cannabis use status, with those with PRD (vs. no) reporting a higher prevalence of cannabis use. Older (vs. younger) adolescents and sexual minority (vs. heterosexual) students reported a higher prevalence of cannabis use, while Hispanic and Asian participants reported a lower prevalence of cannabis use than other racial/ethnic peers.

3.2. Analysis of latent factors

As shown in Table 2, all manifest variables chosen for each of the four latent variables were significantly related to latent variables. For the latent factor of stress and mental health, the largest influence was feeling sad or hopeless (estimate \pm SE = 0.71 ± 0.01 , $p < 0.001$), followed by suicide ideation (0.63 ± 0.02 , $p < 0.001$), poor mental health (0.59 ± 0.02 , $p < 0.001$), and being bullied (0.39 ± 0.02 , $p < 0.001$). The presence of very short sleep (0.48 ± 0.03 , $p < 0.001$) was the most influential on the latent factor of sleep disorder and lack of physical activities. Lack of family and peer support was largely affected by both parent insult (0.40 ± 0.02 , $p < 0.001$) and parent abuse (0.58 ± 0.02 , $p < 0.001$). The manifest variable that had the highest effect on the factor of financial adversity was lack of food (0.40 ± 0.03 , $p < 0.001$), followed by parent loss of job (0.28 ± 0.03 , $p < 0.001$), and self-loss of job (0.24 ± 0.03 , $p < 0.001$).

3.3. SEM analyses

Fig. 2A-2B present the pathways underlying PRD and adolescent

current, and frequent cannabis use, respectively. The indirect effects of PRD on current and frequent cannabis use through the mediating variables were significant for stress and mental health ($\beta_{\text{indirect effect}} [\text{SE}] = 0.03 [0.01]$, $p = 0.02$; $\beta_{\text{indirect effect}} [\text{SE}] = 0.02 [0.01]$, $p < 0.001$, respectively). Sleep disorder and physical activity were not a significant mediator of the association of PRD with current or frequent cannabis use. Financial adversity was associated with current cannabis ($\beta [\text{SE}] = 0.15 [0.06]$, $p = 0.01$) and frequent cannabis use ($\beta [\text{SE}] = 0.26 [0.08]$, $p = 0.002$), but lack of family and peer support was not.

4. Discussion

Discrimination and its potential impact on various aspects of youth well-being is a critical and multifaceted issue that has garnered significant attention in social and public health research (Banks, Kohn-Wood, & Spencer, 2006; Pachter & Coll, 2009). One area of youth well-being that has been shown to have lasting effects is substance abuse (Gibbons et al., 2007; Paige & Colder, 2020; Willford, Goldschmidt, De Genna, Day, & Richardson, 2021). This study explored the complex relationship between PRD and different cannabis use behaviors (e.g., ever, current, and frequent use) through a number of mediation pathways among a nationally representative sample of U.S. high school students. Our findings identified several mediators that can effectively explain the PRD – adolescent cannabis use associations.

First, racial discrimination and encounters with racism can result in persistent stress and trauma among individuals (Anderson, 2013; Franklin, Boyd-Franklin, & Kelly, 2006). Our study adds to the existing literature by showing that PRD could be associated with cannabis current and frequent use through increased stress and mental health issues. In response to the emotional and psychological distress caused by these experiences, cannabis use has been observed as a coping mechanism utilized by some individuals (Gibbons et al., 2007; Lanaway & Burlew, 2021). By leveraging several survey measures (e.g., feeling sad or hopeless, suicide ideation) in this study, the latent factor of stress and mental health significantly mediated the associations of PRD and ever

Table 1
Sample characteristics and prevalence of cannabis use – 2021 ABEH.

Weighted % (95 % CI)	n = 7,705	% (95 % CI)	Current Cannabis Use 12.8 (11.0–14.6)	p-value	Frequent Cannabis Use 3.4 (2.8–4.0)	p-value
PRD				0<.0001		0.0008
No	4816	64.4 (60.9–67.9)	10.9 (8.9–12.9)		2.7 (2.0–3.3)	
Yes	2860	35.6 (32.1–39.1)	16.2 (13.6–18.7)		4.6 (3.5–5.7)	
Age				0<.0001		0<.0001
≤15	2847	36.2 (33.3–39.1)	8.1 (5.8–10.5)		1.4 (0.8–2.0)	
>15	4845	63.8 (60.9–66.7)	15.4 (13.7–17.2)		4.5 (3.7–5.3)	
Sex at birth				0.86		0.01
Female	3678	49.6 (46.1–53.1)	12.9 (11.1–14.7)		4.1 (3.1–5.0)	
Male	3999	50.4 (46.9–53.9)	12.7 (10.0–15.3)		2.7 (2.0–3.4)	
Race and Ethnicity*				0<.0001		0.04
NH-White	3461	49.8 (41.5–58.1)	14.0 (11.7–16.3)		3.6 (2.7–4.4)	
NH-Black	1189	12.9 (8.8–16.9)	13.6 (10.1–17.1)		3.9 (2.6–5.2)	
Hispanic	2038	25.4 (19.6–31.2)	9.9 (6.9–12.9)		2.8 (1.6–3.9)	
Asian	350	4.9 (2.0–7.8)	4.2 (1.4–7.0)		1.1 (0.1–2.1)	
Others	594	7.0 (5.0–9.0)	20.5 (15.5–25.4)		5.4 (2.6–8.2)	
Sexual Minority Status*				0<.0001		0.23
Heterosexual	5539	76.1 (74.1–78.0)	12 (10.2–13.7)		3.2 (2.5–3.8)	
Gay/Lesbian	215	3.0 (2.4–3.6)	12.7 (6.5–18.9)		4.1 (0.8–7.4)	
Bisexual	762	10.0 (9.0–10.9)	20.2 (15.2–25.2)		4.9 (2.9–6.9)	
Unsure or unknown	817	11.0 (9.9–12.1)	12.6 (9.3–16)		3.1 (1.6–4.7)	
Instructional mode of school*				0.005		0.04
In-person only	248	2.4 (0.0–4.9)	16.8 (5.7–27.9)		3.8 (1.2–6.4)	
Virtual only	1853	24.4 (13.8–35.1)	9.0 (6.7–11.2)		2.3 (1.5–3.2)	
Hybrid	5604	73.2 (62.6–83.7)	13.9 (11.8–16.1)		3.7 (2.9–4.5)	

*: The prevalence of PRD was significantly different across race/ethnicity and sexual orientation status. Specifically, across racial and ethnic groups, the prevalence of PRD was 22.5 %, 55.2 %, 41.4 %, 63.9 %, and 51.4 % among NH White, NH Black, Hispanic, NH Asian, and NH other race adolescents, respectively ($p < 0.0001$); across sexual orientation status, the prevalence of PRD was 34.1 %, 39.6 %, 43.8 %, and 37.3 % among heterosexual, gay/lesbian, bisexual, and unsure adolescents, respectively ($p = 0.004$).

Table 2
Loading factors in the latent variables.^a

Factor 1: Stress and mental health ^b				Factor 3: Lack of family and peer support ^c			
	Estimate	SE	p-value		Estimate	SE	p-value
Feel sad or hopeless	0.71	0.01	<0.001	Lack of social connect	0.12	0.02	<0.001
Suicide ideation	0.63	0.02	<0.001	No close friends at school	0.27	0.03	<0.001
Poor mental health	0.59	0.02	<0.001	Parent insult	0.40	0.02	<0.001
Being bullied	0.39	0.02	<0.001	Parent abuse	0.41	0.02	<0.001
Factor 2: Sleep disorder and lack of physical activities ^c				Factor 4: Financial adversity ^d			
	Estimate	SE	p-value		Estimate	SE	p-value
Lack of physical activities	0.21	0.02	<0.001	Parent loss of job	0.28	0.03	<0.001
Very short sleep	0.48	0.03	<0.001	Self-loss of job	0.24	0.03	<0.001
Excess screen time	0.08	0.03	0.01	Lack of food	0.40	0.03	<0.001

^a: Four latent variables were specified using confirmatory factor analysis in the structural equation model. The loading factors were calculated using the maximum likelihood estimation method.

^b:Stress and Mental Health included: 1) *feeling sad* was measured by the question, “During the past 12 months, did you ever feel so sad or hopeless almost every day for two weeks or more in a row that you stopped doing some usual activities?” and coded as 1 (yes) and 0 (no); 2) *being bullied* on school property or electronically in the last 12 months (yes vs. no); 3) *suicide ideation* was measured by the question “During the past 12 months, did you ever seriously consider attempting suicide?” and coded as 1 (yes) and 0 (no); and 4) *mental health problem* was measured by the question, “During the past 30 days, how often was your mental health not good?” with the responses of “most of the day” or “always” coded as 1 and “ever,” “rarely,” and “sometimes” coded as 0.

^c:Sleep disorder and lack of physical activities included: 1) *very short sleep duration* was measured by the question, “On an average school night, how many hours of sleep do you get?” and coded as 1 (≤ 5 h) and 0 (> 5 h); 2) *lack of physical activities* was measured by the question, “During the past 7 days, on how many days were you physically active for a total of at least 60 min per day?” and coded as 1 (≤ 4 days) and 0 (> 4 days); 3) excess screen time was measured by the question, “On an average school day, how many hours do you spend in front of a TV, computer, smart phone, or other electronic device watching shows or videos, playing games, accessing the Internet, or using social media (also called “screen time”)?” and coded as 1 (≥ 3 h) and 0 (< 3 h).

^d:Lack of family and peer support included: 1) *lack of social connection* was measured by the question, “During the COVID-19 pandemic, how often were you able to spend time with family, friends, or other groups, such as clubs or religious groups, by using a computer, phone, or other device?” and coded as 1 (never/rarely) and 0 (sometimes/most of the time/always); 2) *Not close to people at school* was measured by the question, “Do you agree or disagree that you feel close to people at your school?” and coded as 1 (not sure /disagree/strongly disagree) and 0 (agree/strongly agree.). Two additional variables were created to measure how often participants were swore at, insulted, or put down (*parent insult*) and how often they were hit, beat, kick, or physically hurt you in any way (*parent abuse*) by a parent or other adult in your home. Both variables were coded as 1 (rarely/sometimes/most of the time/always) and 0 (never).

^e:Financial adversity included 1) *parent job loss* if the family lost a job during the COVID-19; 2) *self job loss* if students lost a job during the COVID-19; and 3) *short of food* was measured by the question, “During the COVID-19 pandemic, how often did you go hungry because there was not enough food in your home?” and coded as 1 (sometimes/most of the time/always) and 0 (rarely/never).

and current cannabis use and confirmed the importance of mitigating psychological distress in this vulnerable subpopulation. Implementing evidence-based interventions aimed at adolescents experiencing stress and mental health problems can effectively alleviate the impact of racial discrimination, consequently reducing both the onset of cannabis use and its current use.

Second, our study findings suggest that individuals experiencing financial adversity may face heightened vulnerability to cannabis use. Although this connection has been mentioned in research as noted previously (Judd et al., 2023; Nagata et al., 2021; Rege et al., 2011; Whittle et al., 2019), the significant effect through financial adversity highlights a previously underappreciated dimension of this complex relationship. Financial adversity, such as job loss and lack of food, can strain family relationships and lead to conflict or instability within the household, which, in turn, can exacerbate mental health problems and increase the risk of cannabis initiation (Nepl, Senia, & Donnellan, 2016). Future investigations should aim to unravel the underlying mechanisms through which economic insecurity exerts its influence and whether the interplay of financial adversity and PRD may further exacerbate the risk of cannabis use. Understanding this peculiar finding could pave the way for targeted interventions and policies that address economic insecurity as a potential catalyst for cannabis use.

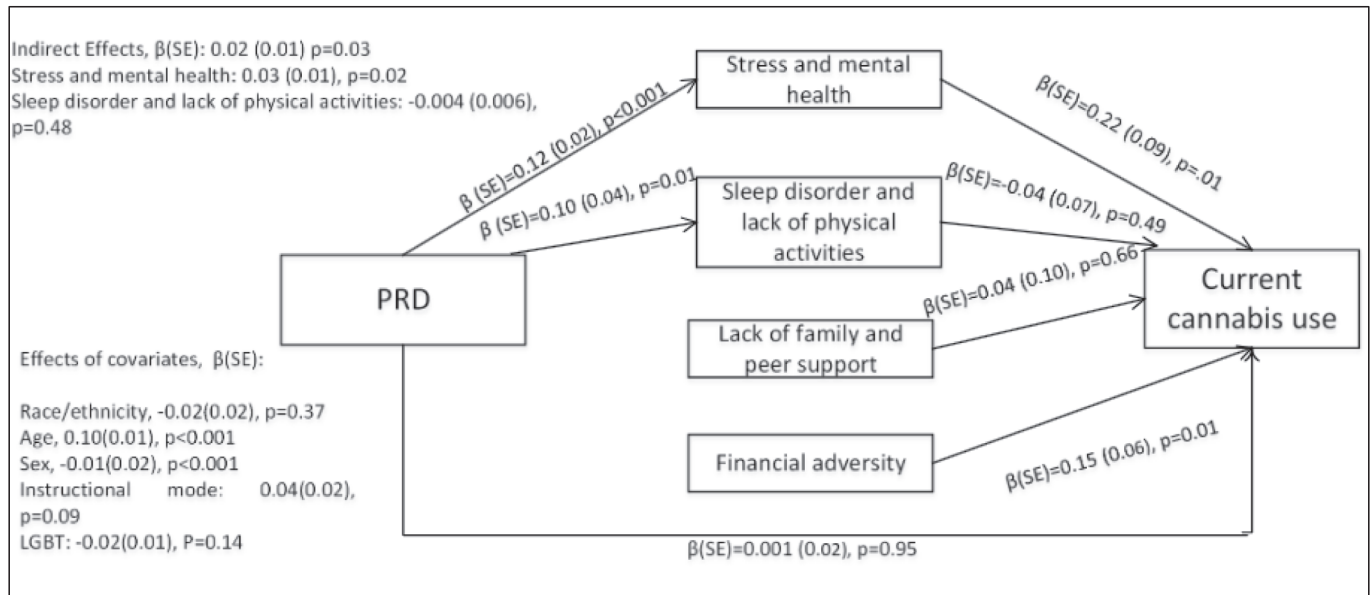
Additionally, this study did not find the latent factor of sleep disorder and lack of physical activity as a significant mediator in the SEM analysis. It is possible that the effect was offset by other mediators due to its correlation with other latent factors. Further research is needed to assess the contribution of this factor in influencing the relationship between discrimination and cannabis use in youth. Furthermore, this study examined the pathways from discrimination to various stages of cannabis use: ever, current, and frequent use, as these measures represent different patterns of cannabis consumption (Terry-McElrath et al., 2020). Our findings showed that the mediation effects differed somewhat across these pathways, highlighting the need for tailored

interventions to address specific cannabis behaviors in adolescents, such as initiation, experimentation, and frequent or chronic use. Moreover, this study also did not find a significant association between lack of family and peer support and cannabis use. It is noteworthy that the ABES survey was collected from January to June 2021 and the COVID-19 pandemic disrupted many aspects of daily life, including social interactions and support networks, which likely reduced family and peer support for youth in various ways (Breux et al., 2023). Inadequate parenting practices and peer support may influence a child’s emotional, psychological well-being, and substance use tendencies (Di Giunta et al., 2022; Peng, Hu, Yu, Xiao, & Luo, 2021), particularly among those already grappling with perceived racial discrimination at school. Future studies should evaluate the intersection effects of family and peer support and discrimination on adolescents’ cannabis initiation and regular use.

4.1. Limitations

Our study has several limitations that need to be considered. First, there is a potential for recall bias when youth respond to surveys about discrimination and cannabis use (Althubaiti, 2016). Second, our measurement of PRD as a lifetime and school-based experience may not fully capture contemporary instances of discrimination occurring in other contexts outside of school and does not reflect other types of discrimination that may be important. Additionally, using a single item to assess PRD might not encompass the complexity of cultural and structural encounters with racism across diverse racial and ethnic groups. Third, we did not inquire about certain socioeconomic and influencing variables such as parental education, household income, and exposure to cannabis marketing, which are recognized as predictors of adolescent substance use (H. Dai, 2017; Goodman & Huang, 2002; Gordon, Russell, & Finan, 2020). However, these variables were not available in the ABES survey. Finally, the ABES survey was conducted during the first half of

A. Current cannabis use (RMSEA 0.037 [0.036, 0.039])



B. Frequent cannabis use (RMSEA 0.046 [0.045, 0.048])

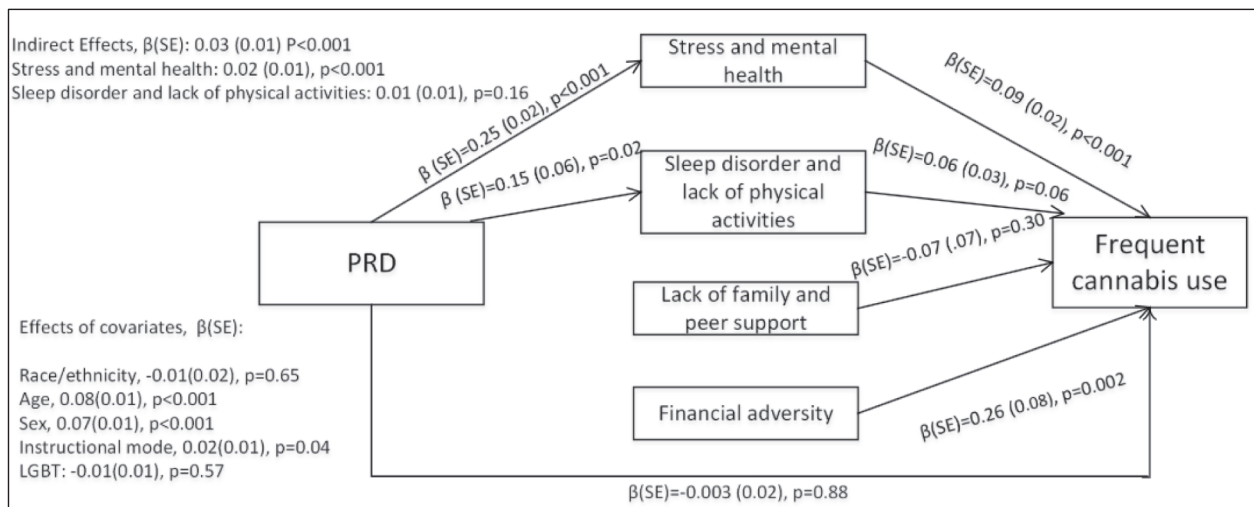


Fig. 2. Mediation analyses on the pathways underlying PRD and adolescent cannabis use.

2021 and some survey questions were asked within the context of the COVID-19 pandemic. Future studies should evaluate whether the mediators can be generalizable to other times outside the COVID-19 period. Finally, given the temporality of the dependent and independent variables in this cross-sectional study, we cannot determine the sequence of perceived PRD and cannabis use, thus precluding the establishment of causal inference.

5. Conclusion

This study examined the pathways that connected adolescents who are subject to PRD with cannabis use. Stress and mental health mediated the PRD-cannabis use associations and lack of financial adversity was associated with cannabis use status. Theoretically, the study supports stress-coping and social determinants frameworks, emphasizing how structural and interpersonal stressors influence cannabis use behaviors. From a public health perspective, the results underscore the importance of developing holistic prevention and intervention strategies that address mental health, stress management, and financial adversities to

reduce substance use disparities in vulnerable adolescents.

CRediT authorship contribution statement

Hongying Daisy Dai: . **Brian Young:** Writing – review & editing, Writing – original draft, Visualization, Validation, Resources, Methodology, Investigation. **Cheryl Beseler:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

This is a secondary analysis of the NSDUH, which is publicly available.

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